CLAIMS

We claim:

1.   A portable data acquisition unit, comprising:

a pressure sensor that is configured to measure pressure signals at a high-frequency rate, the signals pertaining to patient breathing;

a microcontroller that receives pressure signals measured by the pressure sensor and determines clocks times associated with the pressure signals; and

an interface that is configured to output sleep session data from the data acquisition unit to another device.

2.   The portable data acquisition unit of claim 1, wherein the pressure sensor comprises a solid-state pressure sensor.

3.   The portable data acquisition unit of claim 2, wherein the solid-state pressure sensor comprises strain gauges that measure pressure.

4.   The portable data acquisition unit of claim 2, wherein the solid-state pressure sensor comprises a differential bridge, true low-pressure, silicon die sensor.

5.   The portable data acquisition unit of claim 1, wherein the pressure sensor is capable of measuring 6,000 to 10,000 pressure signals per second.

6. The portable data acquisition unit of claim 1, wherein the microcontroller is a digital signal processor.

7. The portable data acquisition unit of claim 1, wherein the microcontroller comprises non-volatile memory.

8. The portable data acquisition unit of claim 7, wherein the non-volatile memory comprises logic that controls generation of sleep session data.

9. The portable data acquisition unit of claim 7, wherein the non-volatile memory comprises logic that analyzes the pressure signals and the clocked times to identify sleep disordered breathing events.

10. The portable data acquisition unit of claim 1, wherein the interface comprises a universal serial bus interface.

11. The portable data acquisition unit of claim 1, further comprising a battery that powers the data acquisition unit.

12.   The portable data acquisition unit of claim 1, further comprising an amplifier that amplifies the pressure signals measured by the pressure sensor and an analog-to-digital converter that converts the amplified pressure signals into digital signals for the microcontroller.

13.   A portable data acquisition unit configured to collect patient information during a sleep session, the unit comprising:

a housing that is configured to be attached to a patient or clothing of the patient;

a solid-state pressure sensor that is configured to measure pressure signals collected by a patient interface positioned adjacent nostrils of the patient;

an amplifier that amplifies the pressure signals measured by the pressure sensor;

an analog-to-digital converter that converts the amplified pressure signals into digital signals;

a microprocessor that receives the digital signals from the analog-to-digital converter and determines clocks times associated with the digital signals;

a battery that powers the data acquisition unit; and

an interface that is configured to transfer pressure and time data from the data acquisition unit to another device.

14.   The portable data acquisition unit of claim 13, wherein the housing is configured to mount to an arm of the patient using an arm band.

15. The portable data acquisition unit of claim 13, wherein the solid-state pressure sensor comprises a differential bridge, true low-pressure, silicon die sensor.

16. The portable data acquisition unit of claim 13, wherein the pressure sensor is capable of measuring 6,000 to 10,000 pressure signals per second.

17. The portable data acquisition unit of claim 13, wherein the microcontroller is a digital signal processor that comprises non-volatile memory that includes logic that controls generation of sleep session data.

18. The portable data acquisition unit of claim 17, wherein the non-volatile memory further includes an algorithm that is configured to analyze pressure and time data to identify sleep disordered breathing events.

19. The portable data acquisition unit of claim 18, wherein the microcontroller is configured to mark identified sleep disordered breathing events to identify them to a user.

20. The portable data acquisition unit of claim 13, wherein the interface comprises a universal serial bus interface.

21.   A data acquisition program stored on a computer-readable medium, the program comprising:

logic configured to receive measured pressure signals collected at a high-frequency rate and store the signals as pressure data;

logic configured to determine times at which the measured pressure signals were measured and store the times as time data;

logic configured to transmit the pressure and time data to a computer.

22.   The program of claim 21, further comprising logic configured to reduce the amount of stored data.

23.   The program of claim 21, further comprising logic configured to compress the stored data.

24.   The program of claim 21, further comprising logic configured to identify sleep disordered breathing events through analysis of the pressure data and the time data.

25.   The program of claim 21, wherein the program is stored on a medium of a portable data acquisition device.

26.   A method of collecting sleep session data for the purpose of identifying sleep disordered breathing of a patient, the method comprising:

providing a portable data acquisition unit to the patient, the data acquisition unit being configured to collect pressure data at a high-frequency rate;

measuring pressure signals that pertain to patient breathing with the data acquisition unit at a high-frequency rate as the patient sleeps and recording a time at which each pressure signal is collected;

downloading pressure data and time data from the data acquisition unit to a computer; and

manipulating the downloaded data with the computer.

27.   The method of claim 26, wherein providing a portable data acquisition unit to the patient comprises providing a portable data acquisition unit to the patient that is configured for wearing by the patient as the patient sleeps.

28.   The method of claim 26, wherein collecting pressure signals with the data acquisition unit at a high-frequency rate comprises collecting pressure signals at a rate of 6,000 to 10,000 pressure signals per second.

29.   The method of claim 26, wherein manipulating the downloaded data with a computer comprises printing the downloaded data as a report.

30. The method of claim 26, wherein manipulating the downloaded data displaying presenting plots of pressure versus time.

31. The method of claim 26, further comprising analyzing the pressure data and the time data to identify sleep disordered breathing events.

32. The method of claim 31, wherein analyzing the pressure data and the time data comprises analyzing the data with the data acquisition unit prior to downloading.

33. The method of claim 31, wherein analyzing the pressure data and the time data comprises analyzing the data with the computer after downloading.

34. A data analysis program stored on a computer-readable medium, the program comprising:

logic configured to receive pressure and time data collected by a portable data acquisition unit during a patient sleep session;

logic configured to analyze the pressure and time data to determine sleep disordered breathing events; and

logic configured to generate a graph that plots pressure versus time, the graph including markers that identify the determined sleep disordered breathing events.

35.   The program of claim 34, further comprising logic configured to collect user-entered data regarding the patient and append that data to the pressure and time data to create a sleep session file.

36.   The program of claim 34, further comprising logic configured to assemble the pressure and time data and generate a printable report that comprises at least one graph that plots pressure versus time.

37.   The program of claim 34, further comprising logic configured to display a complete data graph that plots pressure and time data for the entire sleep session.

38.   The program of claim 37, further comprising logic configured to designate a selected time period of the complete data graph as a normal breathing time period.

39.   The program of claim 37, further comprising logic configured to present a zoomed graph that comprises an expanded view of a portion of the data of the complete data graph.

40.   The program of claim 39, further comprising logic configured to enable designation of start and end points that define a portion of time of the zoomed graph.

41. A user interface for presenting sleep session data to a user, the interface comprising:

a patient information screen with which information concerning a patient whose breathing was monitored during a sleep session using a portable data acquisition unit can be collected;

a select a data file screen with which a pre-existing file containing raw data collected during the sleep session can be selected for the purpose of creating a sleep session file that includes the raw data and the patient information; and

a sleep disordered breathing screen generated using the created sleep session file, the sleep disordered breathing screen displaying a plot of pressure data versus time data in a graph, the sleep disordered breathing screen further displaying markers in the graph that identify automatically-determined sleep disordered breathing events to the user.

42. The interface of claim 41, wherein different markers are used to identify different types of determined sleep disordered breathing events in the graph.

43. The interface of claim 41, wherein the sleep disordered breathing screen is capable of displaying in the graph a marker that identifies normal breathing of the patient.

44. The interface of claim 41, wherein the sleep disordered breathing screen is capable of displaying in the graph markers that identify undetermined events that are not recognized sleep disordered events but which relate to atypical patient breathing.

45. The interface of claim 41, wherein the sleep disordered breathing screen further comprises a zoomed graph in which a portion of data displayed in the other graph can be displayed in an expanded form.

46. The interface of claim 45, wherein the sleep disordered breathing screen further comprises tools that enable the user to conduct analysis of the data displayed in the zoomed graph.

47. The interface of claim 41, wherein the sleep disordered breathing screen further comprises an event summary area in which the total number of determined sleep disordered events and the total number of determined sleep disordered events per hour of the sleep session are displayed.